



ANNUAL REPORT

2021



MESSAGE FROM THE DIRECTOR



“It does not matter
how slowly you go,
so long as you do
not stop.”
—Confucius



ON THE COVER:
O&M crew working
on a concrete pad at
the nursery. Photo by
Andres Garcia.



ON THE BACK COVER:
Repairs at ACDC. Photo
by Andres Garcia.

Much has been said about this past year, and it is hard to compile an annual report that does not acknowledge the inherent challenges this year presented. But within those challenges, the District found many opportunities to further its mission to reduce the risk from flooding for all of Maricopa County’s residents.

As you will see in this report, many of the highlighted projects took several years and many iterations to make it to the finish line. This comes from staff with the tenacity to see things through as well as a willing and engaged public and Board of Directors that remains committed to helping us reach the best solutions. This eye to the future is more impressive when considering that we live in a fast-paced world that demands immediate feedback and instant results.

While it is tempting to think that District projects consist of only planners, engineers, architects and

project managers, that only scratches the surface of the team it takes to ensure safe, effective and long-lasting projects are completed.

Lastly, the District is successful because we take care of what we already have. Our substantial investment in maintenance the past few years pays dividends. We have not only extended the useful life of our structures, but we have also identified a number of improvements simply by paying attention to the conditions on the ground.

Michael Fulton, Director

LEVEE SAFETY PROGRAM



The majority of the District's levees were built in the 70s and 80s before today's federal levee standards were adopted. In response, the District has created a formal, comprehensive Levee Safety Program.

Components of this program include inspections, documented operation and maintenance plans, surveys and emergency action plans. These new measures address rigorous federal requirements, changes to floodplain maps and advances in levee technology.

26
LEVEES

39
MILES

PROTECT
24,000
ACRES

23,000
BUILDINGS

58,000
PEOPLE

THIS IS THE WAY... WE MAINTAIN



The East Maricopa Floodway was built as a grass-lined channel in 1983 to intercept runoff and convey it parallel to the Roosevelt Water Conservation District Canal. The slope of the original channel was very flat, resulting in standing water and ponding conditions.

This year a concrete lowflow channel was constructed from Germann Road to Power Road. Future construction is planned from Guadalupe Road to Ray Road. This small concrete addition to the bottom of channel prevents nuisance water from pooling, allowing for more efficient maintenance. It also

eliminates the standing water that was attracting mosquitos and other pests.

Operation and Maintenance staff can now access, maintain and address the excess sediment that tends to collect at the bottom of the channel. Proper maintenance ensures life-saving flood control for the surrounding area years into the future. Design for additional future lowflow channels are currently under design.



CUDIA CITY WASH



Cudia City Wash area is commonly known as Echo Canyon Wash.

The Cudia City Wash study area (more commonly known as Echo Canyon Wash) focuses on the area of Tatum Boulevard to Stanford Drive between 38th and 52nd Streets. The District is developing a Design Concept Report in this area to update and refine the March 2020 Area Drainage Master Study findings.

Evaluation of the preliminary flood reducing alternatives identified is underway. The District, in collaboration with the City of Phoenix and the Town of Paradise Valley, has determined that redelineation of Cudia City Wash and revision of the Federal Emergency Management Agency (FEMA) maps will be beneficial. Revised floodplain mapping will better identify flood hazards along the wash.

In May 2021, the District presented proposed alternatives to the public through an online

presentation and public comment period. The District will share updates with the public when the delineation efforts are complete.

123
FLOOD
COMPLAINTS

14
SQUARE MILES

37,000
PEOPLE

THIS IS THE WAY... WE INNOVATE

ADMS

AREA DRAINAGE MASTER STUDIES

identify hazards and create computer models to predict where water flows. Flooding data is collected from cities and towns as well as residents.

7 ACTIVE

ADMP

AREA DRAINAGE MASTER PLANS

evaluate mitigation alternatives and can loosely define flood reduction measures. The public can offer input on alternatives cities and towns should consider.

7 ACTIVE

DCR

DESIGN CONCEPT REPORTS

focus on a specific area or an alternative mitigation to further refine plans. Floodplain delineation or the completion of design plans for a proposed project are possible outcomes.

1 ACTIVE

VIRTUAL MEETINGS

Public input is vital for successful projects. The global pandemic did not eliminate the importance of gathering input, but rather it challenged us to reach County residents creatively.

Capitalizing on the public's new virtual meeting acumen, the District delivered public meetings to homes across the County. Blending real-time panels with on-demand presentations, District staff 'met' with dozens of residents from North Mesa, to Northeast Scottsdale to the Echo Canyon (Cudia City) area.

AWARD-WINNING INNOVATION

This year two District groups received national awards for their innovation.

Simple but important Monsoon messages were transformed into well-known acronyms: ASAP (Anticipate Storms and Plan), OMG (Our Monsoon Gear), BFF (Big Flood Forecast), NSFW (Not Safe for Flood Weather) and TGIF (That's Good In Floods), earning the communications group a National Association of Counties (NACo) achievement award as well as a National Association of Flood and Stormwater Management Agencies outreach award.

The District's Water Conservation Branch created a Water Resource Program. Since inception, progress has been made in solidifying its regional role in the integrated management of the region's water resources. The District recognizes the value of stormwater and continues to move toward a more integrated approach to water resource management. This earned the District a NACo achievement award which also named this program a best in category for County Resiliency: Infrastructure, Energy and Sustainability.

STEM EDUCATION



Learning never stops and neither did the District's STEM program. With students online, District staff followed suit. A recording of the in-person flood model presentation was prepared, and this video now lives on the District's YouTube site for teachers to use in the classroom.

The District also modified its STEM curriculum to be useable in a virtual setting. As the pandemic progressed, classrooms were visited via Zoom with

live presentations of the model or other activities.

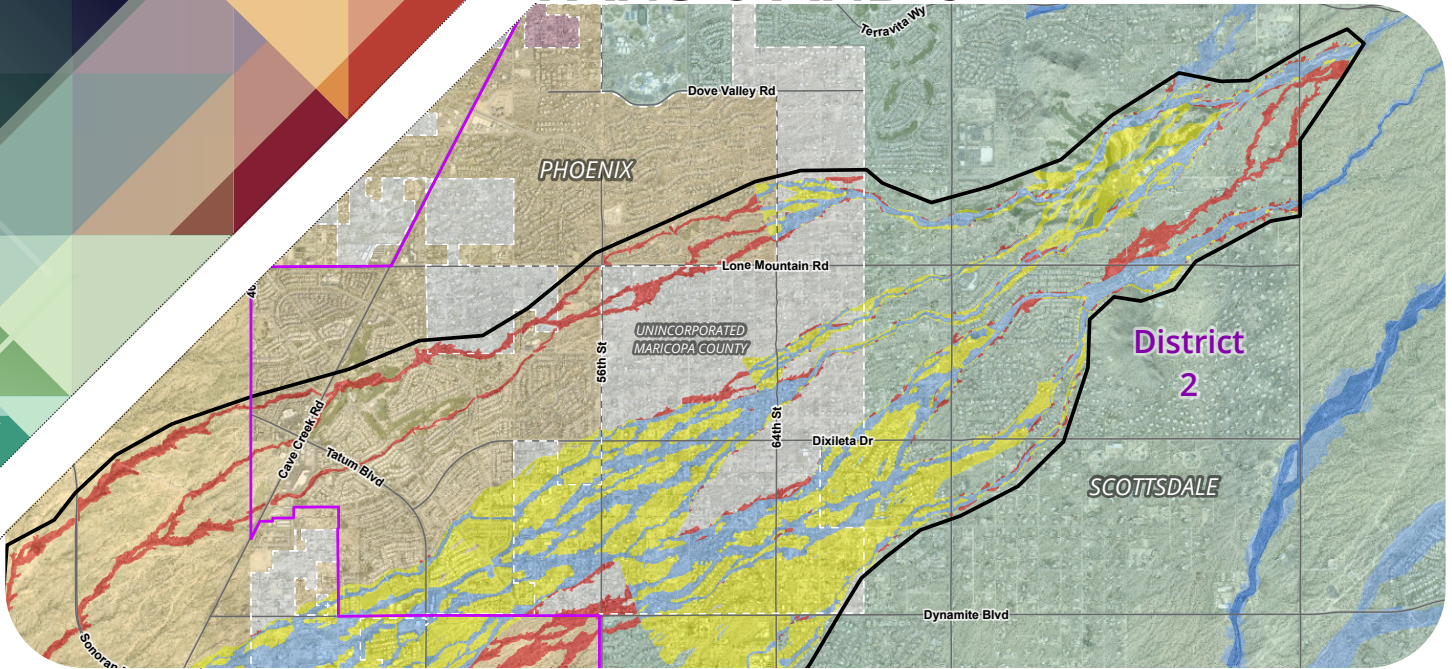
Partnering with organizations, the District attended alternative-format STEM events, including online conferences and even drive-through events.

other STEM



Scan for
more info

FANS 5 AND 6



On July 20, 2021 the maps became effective.

There are thousands of miles of floodplains in Maricopa County. Two such regulatory floodplains, known as Fans 5 and 6, are counted among them. During an Area Drainage Master Study performed in collaboration with the cities of Phoenix and Scottsdale, updated mapping and technical analysis predicted a much smaller area prone to flooding than represented by the existing floodplain boundaries. This prompted the District to update the floodplain map the area.

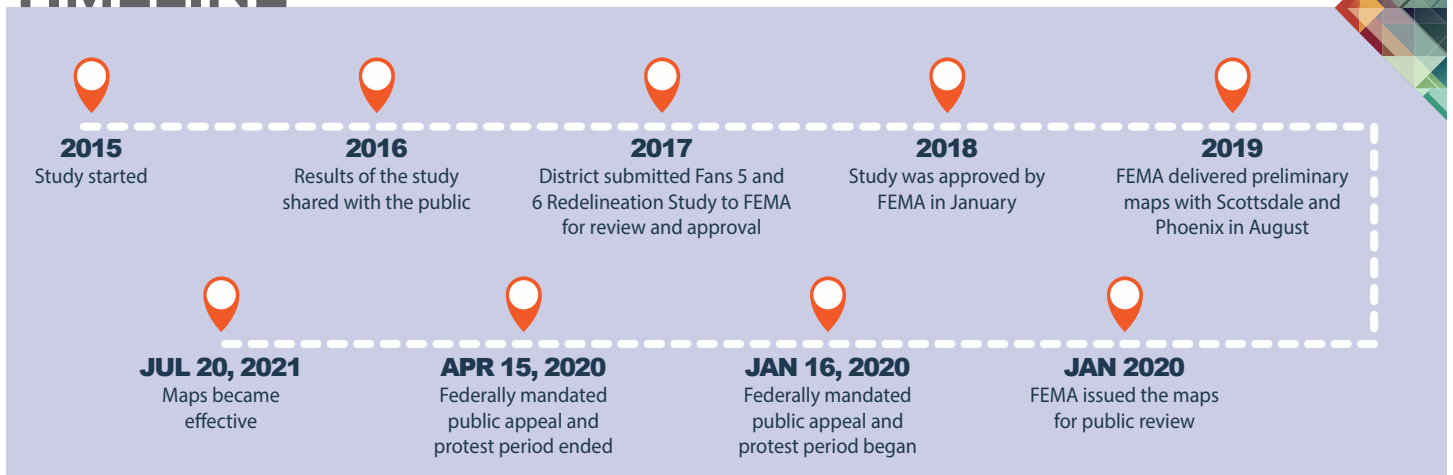
In the area surrounding Fans 5 and 6, modern development meets the natural desert.

For homes already in the area, benefits are great. The updated floodplain maps have identified thousands

of homeowners out of the floodplain, removing the mandatory requirement for flood insurance. Those properties that remain in the floodplain will get new floodplain identification. This could change the price or needs for flood insurance. A few properties have been mapped into the floodplain for the first time. These homeowners now have the knowledge of flooding risk on and around their property.

For those seeking new development in this area, benefits continue. This area has been coveted by land developers for decades; however, the floodplain mapping and regulations made it difficult for developers to build here. New mapping technical analysis will allow new development to occur in a responsible manner.

TIMELINE



THIS IS THE WAY... WE DESIGN



SUN CITY DRAINS

Originally built by Del Webb, these large flood control drains, ranging in age from 30 – 60 years, need repair.

Sixteen areas were prioritized in 2019 to be repaired or replaced to ensure their optimal level of protection. The Olive Avenue Channel was given first priority with construction starting summer 2021.

Engineers have begun designing the next priority, an area of channels along Grand Avenue.



OAK STREET BASIN

This large basin at Oak Street and Hawes Road was originally conceived in 2002, but completion was delayed. When funding became available, the District revisited and updated the existing plans.

The project, in conjunction with already constructed drainage infrastructure, will complete a major feature of the Spook Hill Area Drainage Master Plan providing flood protection for many residents of unincorporated Maricopa County and the City of Mesa.

RAWHIDE WASH



Rawhide Wash was identified as the most significant flood hazard in the Pinnacle Peak West Area Drainage Master Study. During a 100-year flood, Rawhide Wash experiences high flood flows and rapid water velocities which creates a serious flood hazard.

Rawhide Wash is currently identified on FEMA's Flood Insurance Rate Maps as an active alluvial fan floodplain with high flows during major storm events. There are more than 850 buildings located within the FEMA-delineated Special Flood Hazard Area. The implementation of this project has the potential of removing these buildings from the floodplain.

Rawhide Wash was identified as the most significant flood hazard in the Pinnacle Peak West Area Drainage Master Study.

In collaboration with the cities of Phoenix and Scottsdale, the project includes design of a floodwall and levee system to contain the 100-year flood. New floodwalls will be constructed and existing floodwalls and levees will be modified for FEMA certification. Improvements at Happy Valley Road and Los Portones Drive will be constructed to ensure containment of flows are provided at the road crossings.

WHAT IS A 100-YEAR FLOOD?

It is easy to understand why people think this type of flood only happens every 100 years. Instead, it refers to a statistical probability: a 100-year flood has a 1% chance of occurring in any given year.

As a part of its mission, the District calculates the probability of differently-sized floods. The 100-year flood is one way to describe the likelihood of having a flood of a certain size. It is also the baseline

the National Flood Insurance Program uses to determine the requirements for flood insurance. That is why the 100-year flood is also referred to as the base flood.

It is important to remember that while the 100-year flood is a statistical expectation, floods of any size can happen anytime, anywhere and can be more severe than anticipated. That is why **all** homeowners should consider flood insurance.

SMALL PROJECT ASSISTANCE PROGRAM (SPAP)

The District recognizes, especially in urbanized areas, local flooding hazards exist where large structural solutions are impractical. The Small Project Assistance Program, created in 2009, streamlines the contract process between governmental agencies. This allows the District and municipalities to more efficiently complete these smaller, impactful projects.

Projects are evaluated by focusing on the frequency and severity of property flooding, as well as project implementation readiness. The District contributes funding for design and construction to implement these small-sized, local flood mitigation projects. Funding limits have been increased, and project timelines were extended from one to two years.



Sommerset Circle
Drainage in the City
of Mesa.



CITY OF LITCHFIELD

This project will reconstruct Vista Verde Drive routing stormwater to a retention basin. Eleven condominiums are currently at risk for flooding due to undersized catch basins. Adjustments to the road and the addition of a small channel will allow water to be directed away from homes quickly.



TOWN OF FOUNTAIN HILLS

Tropical Storm Rosa damaged the structure at Golden Eagle Park, sending flood water into the surrounding area. The Town will deepen and widen the channels of Ashbrook, Bristol and Cloudburst Wash and enlarge several catch basins to reduce this flooding.



TOWN OF WICKENBURG

Powder House Wash will be straightened, and a low water crossing will be added. These improvements will address the flooded roadways and homes in a flood-prone area.



TOWN OF CAVE CREEK

The Town will stabilize the banks of Galloway Wash to provide erosion protection to structures impacted by flooding in 2018 and 2019.



CITY OF MESA

The District is partnering on three projects within the city. Currently water drains into the cul-de-sac at the end of Sommerset Circle and does not allow water to drain quickly enough. The City

will upsize the storm drain and catch basin, improving the drainage and reducing the flooding risk for residents.

Roads and homes in the area near Val Vista Drive at the Eastern Canal have been subject to repetitive flooding and damage. New storm drains and catch basins will be added to increase stormwater capacity.

Water now runs down Palo Verde, flooding residents along the way. A retention basin north of Abode Street and other catch basins will be built to catch flows and divert water away from homes.

PALOMA PARK

Built in 1985 in partnership with the US Army Corps of Engineers, the New River Dam collects rainwater and releases it safely downstream. The impoundment area of the dam prevents flooding within the cities of Glendale and Peoria.

When the dam was designed, it incorporated provisions for future multiuse activities. The City of Peoria planned that this would one day become a park. This foresight was realized in 2020 with the

construction of its 85-acre Paloma Park for this growing area of the County.

The first job of the dam's dry, native desert impoundment area is flood control. Before constructing Paloma Park, emergency plans were created for when the dam and impoundment area must be called into its primary purpose.

The City of Peoria plans to expand Paloma Park. The District will continue to work



alongside the city to provide both flood protection and recreation amenities to the community.

THIS IS THE WAY... WE BUILD

MANDAN



The Ahwatukee neighborhood along Mandan Street has suffered from chronic flooding. Although not one of the District's larger projects, it provided opportunities to work with the City of Phoenix Parks Department to employ best-in-class landscaping techniques. This combination concrete and earthen channel collects and conveys runoff from the South Mountain Preserve to an existing channel south of the neighborhood. Natural views are a major benefit of this neighborhood, so the District worked with neighbors to design barrier fences that minimize obstructions.

“Our home has sustained severe flood damage from seven rainfalls since we moved here in 1980, so we are extremely appreciative of everything [the District] is doing.”

The terrain and existing utility easements challenged the team to devise a creative plan – one that required the project to expand into the Phoenix South Mountain Preserve. The District collaborated with the city to limit the project's encroachment into the Preserve while also helping restore the native desert impacted by wildcat trails along the park's border.

Construction was finished December 2020 – one month ahead of schedule.

CAVE BUTTES DAM



In 1980s the US Army Corps of Engineers built the Cave Buttes Dam with the District to protect Phoenix from repetitive flooding.

Approximately one million people live downstream of Cave Buttes Dam, as well as major infrastructure and transportation arteries. It is designed to protect large portions of the highly-developed Metro Phoenix area.

While Cave Buttes shows no dam safety deficiencies, the District has implemented improvements to extend the life of this crucial piece of flood protection. Built in the 1980s, the original outlet was much smaller compared to other District dams.

Construction began in 2020 to add a drainage outlet to allow faster drainage and reduce seepage risks. Over four months, a tunneling machine drilled a 932-foot-long tunnel underneath Dike #1. Daylighting, or the completion of drilling, was achieved in September 2020. Crews have installed a new inlet structure and outlet gate, extending the useful life of this critical flood protection structure.

Construction is substantially complete.

DAMS, LEVEES - WHAT'S THE DIFFERENCE?

Dams and levees both play a critical role in flood reduction. While they have similar functions, they are not the same.

All District-managed flood control dams are earthen-filled and capture stormwater runoff during storm events. The captured water is then released slowly into channels to reduce flooding

risk to the surrounding area. All District dams are dry most of the year and are in use only during seasonal storm events.

Levees protect areas from flooding around rivers and major washes. They are earthen embankments that line the river or wash banks to keep the water from overtopping into populated areas.

THIS IS THE WAY...

WE HONOR OUR HISTORY WHILE LOOKING TO THE FUTURE



Aerial view of White
Tank FRS No. 4.

After 60 years, the White Tank Flood Retarding System is a complete system, flowing from north to south along the White Tank Foothills. The system captures and conveys water from mountain runoff starting at Olive Avenue and continues down to final outfall in the Gila River.

The District has brought this system to completion. However, it was not originally designed as an integrated system, as it began with only the construction of two dams. In 1956, the Natural

Resources Conservation Service, then Soil Conservation Service, built White Tank FRS No. 3 and 4. Totalling approximately 3.5 miles in length, they were originally built in coordination with the local irrigation districts to protect farmland that had experienced significant flooding from the uncontained mountain runoff.

When the District was established in 1959, it took over management and operation of these dams. As population grew and more development came to

WHITE TANK FLOOD RETARDING SYSTEM TIMELINE



1956

Construction of White
Tank FRS No. 3 and 4
started



1990s

The District completed an area
drainage master study that identified
a plan to connect the two dams to
create a larger system



1998

The inlet channel
into White Tank
No. 4 was built

the West Valley, the need to safely convey flows from the mountains south to the Gila River also grew. The dams alone were not originally intended for the protection of the newly built homes and critical infrastructure.



PLAN

In the early 1990s, the District completed an area drainage master study that identified a plan to connect the two dams, creating a larger system to reduce risk in this growing area. It conceived of inlet and outlet channels for each dam and final outlet into the Gila River 20 miles away.



CONSTRUCT

The timing of the construction of these channels was determined according to the needs of the surrounding areas. The first piece to be built was an inlet channel into White Tank No. 4 in 1998. It became important to safely collect and move water from the development just north of the dam. The channel starts north of White Tank No. 4 at McDowell Road and empties into the flood pool of the dam.



MAINTAIN

In the early 2000s, the District evaluated its 22 dams for existing and potential dam safety issues. White Tank FRS No. 3 was the first dam rehabilitation taken on by the District (under cost-sharing partnership with the NRCS). It had most, if not all, of the dam safety deficiencies that had been identified at District dams. This included land subsidence, earth fissures, cracking of the embankment and issues surrounding the principal outlets and emergency spillway. It was noted that before rehabilitation, the north end of FRS No. 3 was lower than



the south end by 4.5 feet due to land subsidence. As the District planned for this rehabilitation, an inlet channel and outlet channel was added to both sides of the dam. The inlet channel from Olive Avenue ending in the flood pool of FRS No. 3 was completed in 2009, followed by the completion of the dam rehabilitation in 2011 and the completion of the outlet channel from FRS No. 3 to No. 4's inlet channel in 2013.



DESIGN

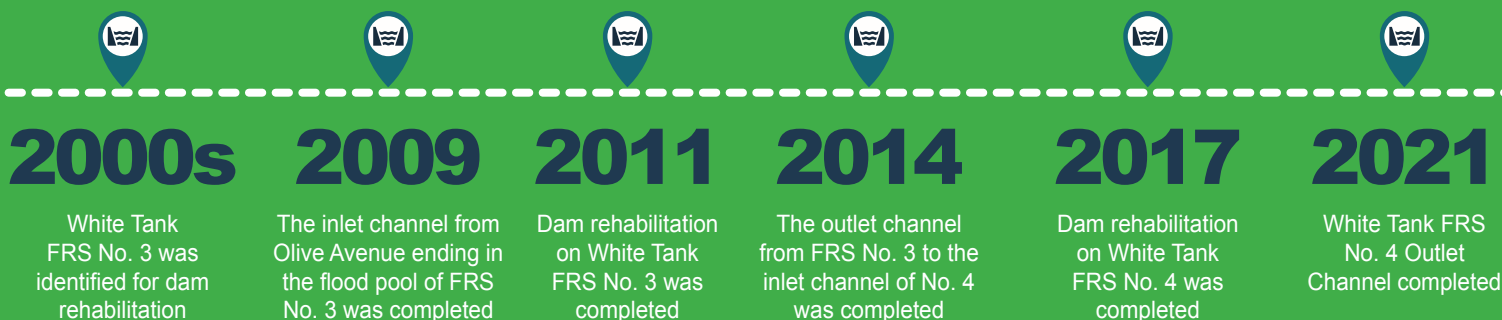
Now the vision of a full flood control system started to become reality. The next piece completed was the product of an opportunity. The District took advantage of the new Loop 303 to coordinate with Arizona Department of Transportation to construct an outfall channel to the river. This five-mile channel reaches from Van Buren Street to the Gila River along Cotton Lane. Future transportation plans, including the extension of the Loop 303 and anticipation of an SR-30 interchange, were taken into account when building the channel.

The next piece to be completed was rehabilitation of White Tank FRS No. 4. Completed in 2017, the rehabilitation extended the life of the dam by 100 years.

It raised and extended the dam to increase dam capacity to hold greater amounts of water from larger storms. A new concrete emergency spillway and a new principal outlet system were also constructed. Like all the District's dams, the impoundment of White Tank No. 4 is dry most of the time. The District partnered with the City of Buckeye in reshaping the impoundment area to both address flood control needs and allow for future recreational facilities .

The final piece to connect this system is the White Tank No. 4 Outlet storm drain. When the rehabilitation of the dam was originally built, outflows from the dam were simply released into the surrounding area. During the historic storm of September 2014, outflow from the dam entered the nearby subdivision and meandered through the greenbelts as designed. However, it was not without impact to the area landscaping.

From Olive Avenue to the Gila River, from the 1950s to the 2020s, what started as two standalone flood structures became bookends for an entire flood control system planned and constructed to deliver protection to many current and future County residents.



WITHOUT
LABOR



NOTHING
PROSPERS